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CONTAINERIZATION AND STANDARDS

Report by the UNCTAD secretariat

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Abbreviations

AFSA	Association Française des Societés d'Autoroutes
APC	American President Company
ASEAN	Association of South-East Asian Nations
CFC	Chlorofluorocarbon
COST	European Cooperation in the Field of Scientific and Technical Research
CPC	Cellular Pallet-wide Container
ESCAP	Economic and Social Commission for Asia and the Pacific
ECE	Economic Commission for Europe
ECMT	European Conference of Ministers of Transport
IAPH	International Association of Ports and Harbours
IICL	Institute of International Container Lessors
ICHCA	International Cargo Handling Co-ordination Association
IMCO	Intergovernmental Maritime Consultative Organization
ISO	International Organization for Standardization
TC 104	Technical Committee 104 - "Freight Containers" of ISO
TEU	Twenty-foot equivalent unit (container)
USD	United States dollar
WG 4	Working Group 4 - "Future Containers" of ISO

Introduction

1. The work programme on shipping, ports and multimodal transport, adopted at the first session of the Standing Committee on Developing Services Sectors: Fostering Competitive Services Sectors in Developing Countries - Shipping, called for the UNCTAD secretariat to "monitor developments in containerization and related transport technology with potential impacts, particularly for developing countries, on countries' transport infrastructure and investment requirements, including developments in the field of standardization of containers." 1/ This report summarizes the desk study on developments of international standards for containers and related activities carried out by the secretariat in response to this request.

2. Chapter I outlines the present status and the modifications made to ISO standard 668 - the most important from the point of view of the interchangeability and modularity of containers used in international multimodal transport. In chapter II, the situation regarding use of non-ISO containers in different regions of the world is outlined. The same chapter also describes the impact of the introduction of larger containers on the different links of the multimodal transport chain, based on surveys conducted by various international bodies. In chapter III, developments in the container manufacturing industry are outlined from the point of view of the dimensional characteristics of new containers entering the industry. For these purposes the data on container production available from the desk study have been used along with that compiled from the sample survey conducted by the UNCTAD secretariat.

3. Chapter IV outlines the most important conclusions reached at the second ECE Seminar on the Impact of Increasing Dimensions of Loading Units on Combined Transport. Chapter V describes certain changes in the International Organization for Standardization (ISO) procedure as regards the adoption of international standards for freight containers and offers a suggestion on the desirability of international agreement on container standards. Chapter VI emphasizes the relevance of the principle of sustainable development to aspects of containerization.

Summary and conclusions

4. Stability of international standards on container dimensions is of paramount importance for the development of multimodal transport. From the beginning of modern containerization, it has been recognized that the impact of container standards on international transport is so important that involvement of Governments has proved to be necessary when major problems in this field arise.

5. This awareness has led to the formulation of the policy of ISO in the field of standards on freight containers: to keep them stable and to ensure their worldwide application thus permitting operators and manufacturers throughout the world to have confidence in long-term developments and investments in the sector.

6. Developments of container transport systems based on the use of containers corresponding to the ISO 668 standard for dimensions and ratings have confirmed that the adopted international standards on containers reflect a fair balance among various requirements of different modes of transportation, from technical, economic, legal and safety points of view. As regards the quantity of containers in service and equipment put into operation to support this system, the point "of no return" has long since been reached. About 7 million TEUs are at present in operation worldwide and almost all of them are ISO standard containers. Container ships, port cranes and facilities, as well as railway rolling stock are designed to handle and move ISO standard containers.

7. Non-ISO standard containers are in use in domestic and some regional trades but so far their presence in the world container trade has been negligible. As was stated at the second ECE Seminar on the Impact of Increasing Dimensions of Loading Units on Combined Transport, 99 per cent of the transportation community will never have any need of containers with dimensions going beyond those prescribed by the present ISO standard 668.

8. However, since in some trades operators have found larger-than-ISO containers profitable, and taking into account that these are the biggest operators, this factor raises the possibility of such containers entering in international trade and standardization of bigger containers has persisted. This led to the elaboration of proposal for second-generation containers.

9. These containers, outlined in the ISO report "Future wide-body containers", have empirically established dimensions incompatible with the existing container systems. Their dimensions also go beyond most existing infrastructure limits. The proposed dimensions have not been accepted by the transport community at large and they have also been rejected by most Governments. The proposed dimensions have not reconciled regional and worldwide requirements for the dimensions of containers based either on more generous road traffic regulations or on advantages provided by the efficient accommodation of the pallets used regionally.

10. Up to now several countries, including developing ones in different regions of the world, have encountered problems with the handling of non-ISO containers. Other countries and regions also may face practical problems if

forced to handle such containers. The possibilities and modalities of dealing with non-ISO containers therefore have to be carefully studied on a case-by-case basis. In some cases it would be logical that during a transitional period, the cost of adaptation of transport systems to handle such non-standard containers should be borne by the operators interested in their introduction.

11. A trend towards the recognition of the second generation containers as a new international standard will certainly persist, especially with the development of trade in high-volume, low-density goods for which such containers are specially designed. In the present economic climate, however, the use of non-ISO containers has diminished dramatically. Furthermore, discussions and studies undertaken on the impact of new container dimensions on the transport industry have shown that the repercussions of the introduction of a new generation of container standards will be heavy. Their introduction will require worldwide coordination of the dimensions of transport equipment for the future. In this connection, the political aspect of the problem of container standards has acquired a new dimension. The question may therefore be raised of whether the present institutional framework for the elaboration and adoption of international standards on container dimensions is still adequate.

12. In recent years, certain modifications have been introduced into ISO procedures of elaboration and adoption of international standards, ostensibly with the aim of streamlining and accelerating these procedures. These modifications, however, have not been undertaken without jeopardizing the democratic character of the procedures which permitted developing and other countries, not represented at the stage of the elaboration of a draft international standard, to influence the process of the adoption of a standard. Moreover, ISO's Technical Committee 104 (ISO/TC 104) - Freight Containers - a body responsible for the elaboration of container standards, has recently departed from its obligation to conduct the widest possible consultations on proposals which may compromise the interchangeability and modularity of containers. While not denying the role of ISO in the elaboration of international standards, it would seem that a question of such importance can no longer be left completely to a non-governmental body which has lost its strong safeguards to guarantee the interests of all parties concerned.

13. In this connection, the proposal to safeguard the interests of long-term investments by the conclusion of a flexible but binding international agreement on container standards for international multimodal transport, put forward during the early stages of containerization, appears once again to have become relevant. Elaboration and adoption of such an international agreement would impart to all users and operators the necessary confidence in the stability of international container standards. The agreement would provide the stability desired and establish an equitable regime for the introduction and application of future internationally agreed container standards and thus contribute to the orderly development of international container transport.

14. In consideration of the problems connected with international container standards, it should be kept in mind that the transport industry is directly concerned with the aims set out at the Earth Summit - the United Nations Conference on Environment and Development (UNCED in June 1992). The related Agenda 21 is a relevant item in this respect, attempting as it does to instil the virtues of "sustainable development" into all relevant development issues. Sustainable development in essence, involves ensuring that current development processes give overriding priority to the needs of the poor and not compromise future economic and social development potentials. This requires adopting policies and technologies which do not endanger the natural systems that support life on Earth.

15. The impact of the transport sector from the ecological point of view, in general, is significant. Consequently, any new development, including the introduction of new international standards for containers, should be considered only if it takes into account this aspect, one that necessarily involves the process of trade-offs. In this context, preliminary consideration indicates that the introduction of larger containers may have negative impacts on the environment.

Chapter I

CHANGING STANDARDS

16. The issue of container standards continues to be one of the most important factors influencing the development of multimodal transport. It is commonly recognized that the stability of international standards for containers is a paramount condition for the orderly and efficient development of container transport worldwide. Though ISO/TC 104 - the body entrusted with the work on container standardization - already in 1978 recognized that "work on the standardization of freight containers had reached the stage at which a high degree of stability can be maintained" (Resolution 71 of the 10th meeting of ISO/TC 104, see Annex 1), 2/ further developments have proved that the basic container standard ISO 668 establishing external dimensions and ratings of series I containers has been changed since its first adoption on several occasions (see table 1).

17. The modifications were justified by the need to adjust standards to the changing trade and technological environment. Fortunately, it may be stated that none of these modifications had affected the most important parameters of containers from the point of view of intermodality - their width and length, so that the modules 8' X 20' and 40' adopted at the beginning of standardization, had not been modified.

Table 1

Series I containers (ISO 668 standard)

Designation	Year of introduction	Length	Width	Height	Rating
1AAA	1993	40'	8'	9'06"	30 480 kg
1AA	1969	40'	8'	8'06"	30 480 kg
1A	1964	40'	8'	8'00"	30 480 kg
1AX	1979	40'	8'	<8'00"	30 480 kg
1BBB	1993	30'	8'	9'06"	25 400 kg
1BB	1974	30'	8'	8'06"	25 400 kg
1B	1964	30'	8'	8'00"	25 400 kg
1BX	1979	30'	8'	<8'06"	25 400 kg
1CC	1974	20'	8'	8'06"	24 000 kg (from 1985)
1C	1964	20'	8'	8'00"	24 000 kg (from 1985)
1CX	1979	20'	8'	<8'00"	24 000 kg (from 1985)
1D	1964	10'	8'	8'00"	10 160 kg
1DX	1979	10'	8'	<8'00"	10 160 kg

Source: ISO 668 standard.

Note: The dimension 9'06", for example, means a 9-foot 6-inch height or 2.9 metres.

18. The most recent and the most controversial of the changes mentioned related to the introduction of 9'06" as a standard container height (1AAA and 1BBB). Containers with such a height are gaining popularity and their share in the total world container population is at present more than 7 per cent (see table 2). However, inland transportation of such containers raises many problems in many places. Often it is impossible. In the inventories of carriers and lessors, such containers continue to be considered as "specials", clearly indicating that they are not "standards". For this reason many countries have been reluctant to accept the introduction of containers of such a height as an international standard (c.f., chapter IV, (a).

Table 2

Proliferation of 20' and 40' long 9'6" high containers (in TEUs)

	1980	1983	1986	1990	1992
Number of 9'06" x 20' and 40' containers	41 160	86 366	188 509	310 050	457 155
Total number of containers	2 499 456	3 798 730	4 778 866	5 102 563	6 373 051
Share of total, per cent	1.65	2.27	3.94	6.07	7.17
Growth rate	1.00	2.09	4.57	7.53	11.10

Source: Computed from the censuses carried out by Containerization International in 1980, 1983 and 1986, and by Cargoware International in 1990 and 1992.

Note: For 1990 and 1992, only dry-freight containers (excluding thermal, tank, flatrack and other types of special containers) were taken into account.

19. It should be borne in mind that resolution 71 of ISO/TC 104 on stability of container standards was adopted in 1978. This was a period when containerization had reached a certain degree of maturity. ISO containers had come to be largely accepted by the transport community. The use of pre-ISO containers had been phased out, though, at the same time it was recognized that the use of non-ISO containers would continue to have a place when it responded to the needs of particular trades.

20. The developments in containerization have since confirmed the trends outlined at that time and have proved that the adopted international container standards on dimensions and ratings reflect a fair balance among a range of different requirements - technical, safety, operational, legal and economic - of marine, rail and road transport. The world container fleet has since

increased fourfold in numbers and its homogeneity has been steadily growing, reflecting the worldwide acceptance of ISO standards (see table 3). About 90 per cent of the world container population is now represented by 20' and 40' long containers with 8'6" height. If 9'6" 20' and 40' long high-cubes are included, it may be stated that the world container population in its overwhelming majority corresponds to ISO standard 668.

Table 3

Share of 20' and 40' long 8'6" high containers (in TEUs)

	1980	1983	1986	1990	1992
Total number	2 499 456	3 798 730	4 778 866	5 874 084	7 320 400
8'06" x 20'	934 481	1 834 280	2 185 102	2 475 725	3 157 339
8'06" x 40'	945 668	1 417 338	2 026 636	2 542 952	3 290 166
8'06" x 20' and 40'	**1 880 149**	**3 251 618**	**4 211 738**	**5 018 677**	**6 447 505**
Per cent	75.2	85.6	88.1	85.4	88.0

Source: Computed from the censuses carried out by Containerization International in 1980, 1983 and 1986, and by Cargoware International in 1990 and 1992.

21. Apart from some domestic (United States) and regional trades (Europe), non-ISO containers are for the most part in use only in specific international trades, where high-volume, low-density cargo prevails. Except for their length, they correspond to ISO specifications. The share of such containers in the world container population is negligible. As the present report will show (see chapter II), there is no universal use of these containers nor apparently are there prospects for their general acceptance in the near future. There are some indications that the markets where such containers had been in demand are becoming saturated and consequently orders for them were declining. Indeed, Maersk and other major vessel-operating multimodal transport operators (VO-MTOs) at the moment only use refrigerated 45' containers on the European continent, while Sea-Land has completely abandoned use of containers of this length.

22. A certain persistence in the use of non-ISO containers has raised the question of their possible standardization. TC 104 has taken the initiative in this respect and a proposal was put forward for a "second generation" of ISO standard containers. This proposal was elaborated by Working Group 4, "Future Containers" (WG 4) convened within TC 104 of the International Organization for Standardization in 1987. A proposal for a new draft standard was set out as a result in its report entitled "Future wide-body containers", in 1991. 3/

23. The main external dimensions for future generation containers proposed in this report are as follows:

Height:	2,896 mm	(9'6")
	2,591 mm	(8'6")
Length:	7,430 mm	(24'0")
	14,935 mm	(49'0")
Width:	2,595 mm	(8'6").

24. It may be seen, as regards their length, that the proposed containers differ from those adopted by the regional standardization bodies. The latter were based, in general, on non-ISO units already in operation in the regions: domestic containers in the United States and swap-bodies and inland containers in Europe. In view of the strong opposition to it, the proposal was not issued as a formal ISO technical report. Instead it was retained as an internal TC 104 reference document, and WG 4 itself was disbanded. This document was subsequently put before the second ECE Seminar on the Impact of Increasing Dimensions of Loading Units, in September 1992. 4/ A later chapter of this report (Chapter IV) gives more information on this Seminar.

Chapter II

SITUATION IN THE FIELD OF USE OF NON-ISO CONTAINERS

A. IAPH study

25. According to a survey conducted by the International Association of Ports and Harbours (IAPH) in 1991, 5/ of a total of 154 responding ports, a third (49) reported having handled non-ISO containers. A total number of such containers - 1,541,039 - constituted only 3.8 per cent of the total number of container handlings reported (40,849,311). This small number of non-ISO containers included some with a height of 9'06" (56 per cent of total non-ISO reported) which meanwhile became a standard height. Of the 49 ports responding as having handled non-ISO containers, 26 ports (53 per cent) handled less than 1 per cent non-ISO containers, 15 ports (31 per cent) between 1 and 10 per cent, and 8 ports (16 per cent) between 10 and 100 per cent. From its survey, IAPH has drawn the conclusion that because the handling of non-ISO containers remains confined to a certain range of ports, their handling cannot yet be identified as a global issue to be tackled as a whole by the world port community.

26. With regard to specific dimensions, the IAPH survey revealed that 99.7 per cent of over-height containers measure 9'6" and 94.3 per cent of over-length containers measure 45'.

27. The container terminal of the main Indonesian port, Tanjung Priok, may be cited as one example of a place where a developing country has had to deal with non-ISO standard containers. When in 1987 some shipping lines tried to bring 45' containers to this terminal it was declared that the terminal would accept only standard containers because the design of the terminal and the container-handling equipment were conceived for ISO container handling only. But with the development of trade between the United States and the other South East Asia countries, non-ISO containers were gradually introduced. In order not to lose Indonesia's share of the market, the policy of not accepting non-ISO containers was changed. To accommodate non-ISO containers, the terminal introduced special regulations whereby a limited number of such containers in each shipment were admitted to the terminal and the shipping lines were requested to pick up these containers from the terminal as soon as possible so that they would not hinder normal operations. In the first half of 1992, the port handled 212 of the 45' containers, out of a total of about 455,000 TEUs.

28. If the terminal is to handle in the long run a greater number of non-ISO containers, the facilities will need serious upgrading. Possibly it may be necessary to allocate an area in the terminal reserved for handling such containers. In any case, according to the port authorities, the tariffs for handling non-ISO containers must be adjusted so as to recover the outlays for additional investments and the loss of the operational flexibility of the terminal.

Table 4

Regional distribution of non-ISO containers handled

Region	Number of responding ports	Number of non-ISO containers handled	Share, per cent
Africa	5	0	-
South America	1	0	-
Australasia	14	14	-
Caribbean	2	1 709	0.1
Mid-East	14	2 618	0.2
Europe	53	252 299	16.4
Asia	46	439 217	28.5
North America	19	845 182	54.8
Total	154	1 541 039	100

Source: Survey on the penetration of non-ISO standard containers. Compiled and printed by IAPH, Tokyo, Japan, August 1992.

29. In terms of geographical distribution (in table 4), the great majority of non-ISO standard containers are concentrated in the North American region, followed by Asia and Europe. Most of the developing countries do not handle such containers. This conclusion is also confirmed by the census of the world container population carried out by Cargoware International in mid-1992. 6/ According to this census, North American owners control 72.5 per cent of all non-ISO length containers.

B. North American continent

30. According to the 1992 census of the world container population conducted by Cargoware International, about 80 per cent of all high-cube inventories (9'6" height) were held by owners in North America and the Far East. It is of particular significance that over 20 per cent of all high-cube containers (about 143,000 TEUs) were the 45', 48' and 53' non-ISO containers concentrated in domestic North American trades.

Table 5

Composition of the United States container fleet, 1991
(in real units)

Length	Carriers	Lessors	Total	Share, per cent
53'	1 200	-	1 200	*
48'	7 282	-	7 282	*
45'	21 263	997	22 260	1 21
40'	214 051	637 744	851 795	46 12
24'	12 438	-	12 438	*
23'	-	101	101	*
20'	69 191	882 636	951 827	51 54
10'	-	48	48	*
Total	325 425	1 521 526	1 848 951	100
TEUs	580 717	2 160 507	2 741 224	

Source: Inventory of American intermodal equipment - 1991, Maritime Administration, United States Department of Transport, November 1992.

Note: *negligible percentage.

31. Of all the oversize containers, by far the greatest number are the 45' length units. A certain number of these containers are specials, such as flatracks and reefers. All the 45' units are 9'06" high, some are 8'06" wide, and have end-frames at 40'. Some of them are used in international trades: they are scattered in small numbers along the trans-Atlantic, Asian inter-port, Europe/Asia and Caribbean trade routes. These containers were first introduced by American President Company (APC), other multimodal transport operators followed suit. At present, ownership of such containers is divided among a handful of major operators. Thus, where these carriers operate, 45' containers may be seen and, despite the potential handling problems, they are increasingly appearing in the ports of developing countries.

32. Unlike the 45' units, the 48' units are nearly all in domestic trade in the United States, although a few have been built to marine standards and are occasionally seen in east Asian ports (other than Japan).

33. Non-ISO wide-body (8'6"-wide) (United States) domestic lightweight containers have been progressively introduced at the expense of piggy-back technology by American railways in their competition with road carriers. The internal volume of the container plays a non-negligible role in the economics of this traffic. By 1990, about 40 states in the United States allowed a trailer length of up to 53' on their highways. That step prompted railways to introduce containers of greater length in connection with the development of double-stack container trains. In the United States, double-stack container trains are considered profitable when the distance of transportation is in

excess of 800 miles (about 1,300 kilometres). For shorter distances, the cost of managing chassis and of terminal handling apparently outweighs the advantages.

34. In general, 53'-long containers tend to be deployed in specific city-to-city corridors in the United States and are tailored primarily to individual American customers' requirements. In 13 states they may not legally be moved by road. Since the demand for 53' long containers is not very high, it is not expected that their number would increase significantly in the near future. According to 1992 data of the United States Maritime Administration, no such containers were on order by railways or other transport or leasing companies.

35. In spite of the rapid increase of domestic intermodal traffic, most revenue for operators of double-stack trains in North America has come not from domestic but from international traffic carried in maritime ISO containers which represent the overwhelming majority of the container population in the United States (see table 5).

36. The following example proves that the height of containers is no longer limited to 9'6" (2.9 m). To meet the requirements of certain categories of domestic shippers, APC introduced a prototype of a new lightweight 9'9" high container described as the largest intermodal container in the world. With dimensions of 53' x 9'09" x 8'06", this container has a vertical door opening of 110" extending along the container's inside. It is argued that many domestic shippers welcome such a facility provided usually only by road transport vehicles, and are not prepared to do business with a transporter which cannot provide it.

37. It is worthwhile adding that, even in the United States, the introduction of bigger containers poses certain difficulties, including adaptation of chassis and of handling equipment. Unlike American highways, railways in the United States are not regulated by government as to the dimension or weight. They are thus constrained only by economic, infrastructure and investment barriers. Infrastructural constraints are often hard to overcome, with the costs usually borne by the railways themselves. For example, the length of a rail wagon is limited to 89' (27.1 m) by the conditions of track geometry. It is not possible to carry two containers longer than 44'06" in the lower tier of a double-stack wagon. Consequently, long containers (45', 48', and 53') have to be transported on top of 20' and 40' containers on the upper tier.

38. It has been estimated that as many as one-third of the containers shipped in the United States may exceed the prescribed road weight limitations. This results in serious road bed damage and creates safety problems in connection with their movements. The problem of overloaded containers was considered so serious that a special law (the Intermodal Safe Container Act of 1992) was adopted requiring shippers to give initial (road) carriers accurate written information about the nature and weight of the cargo carried inside each container.

C. European Community

39. The use of non-ISO containers is not a monopoly of United States domestic transportation. Swap-bodies and inland containers of different lengths and with a width of 2.5m are widely used in the European logistics systems in conjunction with palletized goods. It is estimated that an equivalent of about 200,000 TEUs of these containers are presently in operation. Among them the so-called "cellular pallet-wide containers" (CPC) should be mentioned as gaining popularity in short-haul sea and coastal trades. The main feature of these containers is that they have 8' wide end-frames and a width of 2.5m along the sidewalls. They may thus be carried in standard containership cells while at the same time providing side-by-side stowage of 1,200mm-wide pallets. The fact that the attention of leasing companies has recently been attracted to such containers suggests that they are gaining popularity.

40. As an exceptional example of a specific case, one may cite the 7.70m long and 3.10m high containers used by a European company supporting the trade between Antwerp and Romania by railway. The use of specialized Multifret rolling stock with a loading platform height of only 94cm above the railhead permits transportation of these containers by European railways having limited margins. The company has deployed this equipment in an effort to maximize the unit load volume in the trade with long frontier delays and a big potential risk of pilferage. This example confirms the conclusions set out in a report of the European Conference of Ministers of Transport (ECMT) that "broadly speaking, very large units can still be carried, but on an exceptional basis and subject to exceptional arrangements and provided that they meet a need". 7/

41. For the purposes of the second ECE Seminar on the Impact of Increasing Dimensions of Loading Units on Combined Transport, the European Cooperation in the field of Scientific and Technical Research (COST) carried out a world-wide survey on the consequences of an introduction of proposed new generation containers, the so-called COST 315 study. 8/ The study revealed that, at present, new-generation containers were unacceptable for Europe. As an example, for the European railways, the study concluded that the introduction of larger containers "will clearly have a negative effect on rail transport, at least in the short run, due to the difficulties and costs linked to the need to enlarge the loading gauge, adapt structures and terminals, invest in new rolling stock and operate a wider variation of different intermodal loading units".

D. Port equipment

42. Though many ports in recent years have ordered ship-to-shore container cranes with spreaders capable of handling longer-than-40'-containers, the majority of cranes now in service are not suitable for handling over-length containers (see table 6). About one-third of all container cranes capable of handling non-ISO over-length containers are located in North America. European ports, despite their large share of world container trade, hold under one-fifth of such cranes. Ports in South East Asia have the largest share of container cranes equipped with spreaders capable of handling 40'-plus containers. Here the over-length units outnumber the conventional ones by 2 to 1. This indicates that most ASEAN terminals have been equipped in recent

years since it became more and more common practice to order spreaders suitable for handling longer-than-ISO containers, mainly the 45'-long containers coming from United States ports. Conversely, although European ports have recently made big purchases of such equipment, the small proportion of such cranes presently in service in Europe suggests that European port operators are not convinced of the necessity of 40'-plus spreaders, owing to insufficient traffic of non-ISO containers to justify the additional investment.

Table 6

Analysis of spreaders used in conjunction with ship-to-shore cranes by ability to handle containers longer than 40'

Ability to handle longer than 40'	Europe	North America	North Asia	South East Asia	Mid-East India	Other regions*	Total
Yes	72	123	91	57	26	9	378
No	510	260	183	27	97	197	1 274
Unknown	120	91	61	15	25	65	377
Total	702	474	335	99	148	271	2 029

Source: Cargoware International, December 1991, p. 30.

Note: *Includes Africa, Australasia and Central and South America.

43. In a report of ECMT presented to the second ECE Seminar on the Impact of Increasing Dimensions of Loading Units on Combined Transport, it was stated that the figures from five main container berths in Antwerp indicated that of a 120,000-container population handled, only about 30 were 45'-long containers. 9/

44. According to the same report, the introduction of longer-than-ISO-standard containers may entrain the following consequences for a port:

* obsolescence of handling equipment;

* lower productivity;

* poorer safety; and

* disorganization in operation.

Table 7

Extracts from the crane modification cost guide

Alteration activity	1,000 US$ (1992)
Raise gantry from 4.9 m to 6.1 m	580/670
Widen leg width (pass-through arch)	1,800/2,250
Increase outreach by 30' (9.1 m)	900/1,075
Increase hoist capacity by 33 per cent	670/780
Change shore power to diesel	425/515
Increase hoist speed by 40 per cent	680/790

Source: Cargo Systems, October 1992, p.153.

45. A modern container ship-to-shore crane costs about 7.2 million US$. According to general cost guidelines in relation to different alterations of cranes in service, submitted by a company having significant experience in this field, a 20-year-old crane can be rebuilt to required dimensions and speeds for one-half the cost and one-third the calendar time required for the purchase of a modern Panamax crane. Thereby, the service life of the crane can be extended for another 20 years or more. It is interesting to note that of all subsequent modifications of a container crane widening the leg width (pass-through) is by far the most expensive crane adjustment.

Chapter III

NEW CONTAINERS ENTERING THE INDUSTRY

A. Concentration in container industry

46. A remarkable trend towards concentration and further growth of the container industry has been observed during the past several years. In 1985, the number of factories producing more than 10,000 TEUs a year was 26 with a combined total production reaching 438,320 TEUs. In 1991, the number of manufacturers with a production capacity over 10,000 TEUs had reached 54, with an annual production of 788,820 TEUs or about 90 per cent of all containers produced that year. At the same time, according to Containerization International Yearbook (1987 and 1992 editions), the number of manufacturers having production capacity in the range below 10,000 TEUs decreased from 97 to 79 and their share in total production fell from 19 to 10 per cent.

47. In 1992, the one million TEUs production level was passed for the first time, to reach 1.15 million TEUs. Many new-generation manufacturing facilities started producing during that period, especially in Asia, where about 80 per cent of all containers were manufactured. Almost half of that production came from the Republic of Korea, which kept its leading position among the region's producers. However, the pattern of the world's container manufacturing industry has been changing; it is becoming more widely dispersed across China and the countries of South East Asia (Indonesia, Malaysia, Philippines, Thailand). It was estimated that, by the end of 1992, China had developed a theoretical annual manufacturing capacity of 200,000 TEUs from 20 different manufacturers, while Indonesia had about 135,000 TEUs and Thailand 192,000 TEUs.

48. However, in the second half of 1992 the situation in the container market and, consequently, in the container production industry, changed radically. Demand had slumped, forcing manufacturers to curtail production and sometimes to close newly commissioned facilities. It was estimated that in the first half of 1993, the container manufacturing industry in China had an over-capacity of around 35 per cent, while that of Indonesia ranged from 50 to 60 per cent; the figure for Thailand may possibly have been even higher. Production in the Republic of Korea for the first three months of 1993 was almost 50 per cent below that of the same quarter in 1992.

49. Table 8 shows that the bulk of containers produced was represented by standard dry freight 20' and 40' containers, with the share of 40' containers rising steadily. Contrary to this trend no growth was seen in the number of longer-than-ISO containers produced. This would seem to confirm that there has been saturation where such containers are in use.

B. UNCTAD survey on dimensions of containers entering the industry

50. The UNCTAD secretariat conducted a sample survey of the dimensions of dry-freight containers entering the industry from certain container manufacturers. The survey covered about 25 to 30 per cent of the annual production output. Its coverage reflected the changing pattern of the world container production industry, with most of 25 responders being located in the

countries of Eastern Asia. The summary of the statistics showing the distribution of new containers by length appears in table 9 while that by height is given in table 10.

51. Among non-ISO lengths, only 45'-long containers were noticeable in the replies received by the UNCTAD secretariat (125 units), produced in one of the new factories commissioned on the North American continent. The vast majority of "others" (in relation to length) was represented by 30' containers for dry bulk cargo; the rest were 10' small containers.

52. In relation to height, containers other than 8', 8'06" and 9'06", except for 1992, were almost equally represented by 4'03"-half-height and 9'-swap bodies. In the figures for 1992, all the "others" in relation to height are represented by 9'-swap-bodies.

53. Like the previous study, 10/ the survey did not reveal any significant signs of proliferation of non-ISO dimensions (by length or height) among new containers. Conversely, the survey confirmed the trend towards an increasing demand for 40'-containers and a significant consolidation of the position of 8'06" high containers. High-cube 9'06"-high containers have been steadily taking their place in the production lines since 1991. With the adoption of this height as an international standard, the trend towards their further spread would certainly be confirmed.

Table 8

Estimated world container production by type for 1990, 1991 and 1992
(in TEUs)

Type of container	1992	1991	1990
Dry freight	1 080 000	870 000	750 000
Standard	1 020 000	810 000	700 000
Special*	44 000	42 000	25 000
Euro pallet-wide	8 000	8 000	10 000
(over 40'long)	8 000	10 000	15 000
Refrigerated	64 000	35 000	44 000
Tank containers	6 000	5 000	6 000
World total	1 150 000	910 000	800 000

Source: Cargoware International, February 1993, p. 27.

Note: *Including open-top, flatrack, platform, ventilated, bulk, open-side types.

Table 9

Distribution of containers entering the industry by length
(in TEUs)

Length	1989 TEUs/Share	1990 TEUs/Share	1991 TEUs/Share	1992 TEUs/Share
20'	76,209/60.6	88,899/52.9	89,904/43.0	132,598/43.5
40'	49,569/39.4	78,998/47.0	119,218/57.0	172,366/56.5
45'	-	-	-	125***/**
Others*	-	214/0.1	-	-
Total	125,778/100	168,111/100	209,122/100	305,089/100

Source: Replies to the UNCTAD secretariat questionnaire.

Note: * Includes 10' and 30' containers.
** Negligible percentage.
*** Real units.

Table 10

Distribution of containers entering the industry by height
(in TEUs)

Height	1989 TEUs	Share	1990 TEUs	Share	1991 TEUs	Share	1992 TEUs	Share
8'	6 244	5.0	2 155	1.3	219	0.1	-	
8'06"	119 304	94.8	165 347	98.4	204 497	97.8	291 104	95.4
9'06"	-		-		3 790	1.8	12 985	4.3
Others*	230	0.2	609	0.3	616	0.3	1 000	0.3
Total	125 778	100	168 111	100	209 122	100	305 089	100

Source: Replies to the UNCTAD secretariat questionnaire.
Note: *Includes 9'0" and half-height (4'03") containers.

Chapter IV

SECOND SEMINAR ON THE IMPACT OF INCREASING DIMENSIONS OF LOADING UNITS ON COMBINED TRANSPORT

54. The two ECE seminars on the Impact of Increasing Dimensions of Loading Units on Combined Transport, convened within the United Nations system under the influence of the growing concern over the possible impact of the introduction of a new international standard on freight containers, have played an important role in the international debates on developments in the field of international container standards. At these seminars views on the acute problem of container standards development were expressed not only by representatives of the industry but also by Governments.

55. The second seminar took place in Geneva from 1 to 4 September 1992 under the auspices of the United Nations Economic Commission for Europe. 11/ Like the first seminar, held in November 1989, the second seminar was convened with the assistance of UNCTAD with a view to enabling UNCTAD member States, especially developing countries, to take part in the discussions and in the formulation of the recommendations adopted by the Seminar.

56. Participation in the Seminar was fairly representative: some 33 countries attended of which 10 had come in response to the invitation of the UNCTAD secretariat. More than 20 international organizations and representatives of the industry also took part.

57. The discussion confirmed that, at least in the short and medium term, it was not possible to reach a consensus on any new globally acceptable dimensional standards for containers, given different traffic regulations, infrastructure requirements and the huge investments made in container vessels, port equipment and inland rolling stock in many countries of the world.

58. The seminar adopted a resolution in which it took note of the concern raised in transport circles and by many Governments of the possible impact of increasing dimensions of containers on the organization of the transport chain and on transport infrastructure. It took into account the fact that many operators of maritime transport would face severe problems, particularly with regard to cellular ships and port equipment, if containers of a width and length other than those of existing ISO series I containers needed to be handled. Concern was also expressed for the problems likewise posed for inland waterway and rail transport operators.

59. The Seminar recommended that the existing ISO series I containers "which particularly in most developing countries had been the basis for recent large-scale investment in infrastructure, rolling stock and handling equipment, should continue to be the main container standard which should be improved in line with emerging market requirements". 12/

60. The Seminar also recommended certain principles that should guide Governments and international organizations in terms of their approach to acceptance and standardization of new dimensions of loading units which would be acceptable to shippers and the transport industry worldwide.

61. The Seminar concluded that, in the foreseeable future, regular inland transport of units with a length of 49' (14.9m) and a width of 8'6" (2.6m) would be virtually excluded in most countries of Africa, Asia, Europe and Australasia. Equally, the 24'6" (7.43m) half-size container proposed by the ISO would not be acceptable because of its width.

62. With respect to operations in certain countries (in Europe) the Seminar concluded that "a container with a length of 7.43m (24'6"), a width of 2.50m and a height of 2.60m would, from a technical and legal standpoint, be acceptable for inland transport. While these countries felt that such loading units would be commercially attractive, for a large number of other countries such dimensions would be neither economic nor viable. Increases, particularly in width and height, beyond these dimensions would lead to an increase in difficulties for the handling and transport of such loading units. A worldwide use of loading units with dimensions beyond 2.55m in width and 2.90m in height would not seem to be possible". 13/

63. Discussions at the Seminar confirmed that the problem of the international standardization of container dimensions would remain acute and vitally important for the development of multimodal transport worldwide. For this reason, the UNCTAD secretariat will continue to monitor these developments and contribute to discussions on this subject in order to safeguard the interests of member States in this field.

Chapter V

ISO CHANGING PROCEDURE

A. Modifications in the adoption of international standards

64. The Ad Hoc Intergovernmental Group on Container Standards for International Multimodal Transport, held two sessions, respectively, in 1976 and 1979, in which participants unanimously expressed strong support for the ISO work on container standards and commended its procedures. 14/ The ISO procedures have been considered as being sufficiently democratic to allow everybody to express their concern or objections to new standards' proposals. Unfortunately, as experience has shown, the lack of interest of many countries and the non-critical acceptance on the part of national authorities often resulted in missed opportunities to express views or concerns. Moreover, certain modifications had recently been introduced in ISO procedures for adoption of international standards which do not make them more democratic.

65. The introduction into ISO 668 of a new height - 9'6" - is a good example. At its sixteenth session in May 1991, TC 104 confirmed its earlier decision, taken in London in 1989, to introduce an additional container height of 9'6" (2.9m) into the ISO 668 standard with designation 1AAA (40') and 1BBB (30'). It may be recalled that in spite of that decision, the central ISO secretariat at that time did not take any further action on this proposal considering it as a new dimension under resolution 22/1978, and requested TC 104 to prepare a comprehensive report and evaluation showing that this new height was in the common interest of all parties concerned.

66. A draft international standard (DIS) in this respect was circulated by the ISO secretariat to all ISO member bodies for voting on 19 March 1992. According to new ISO directives (1992), a draft international standard "having been circulated for voting is approved if

(a) a two-thirds majority of votes cast by the P-members of the technical committee or subcommittee are in favour, and

(b) not more than one quarter of the total number of votes cast are negative.

Abstentions are excluded when the votes are counted, as well as negative votes not accompanied by technical reasons." 15/

67. In the previous edition of the ISO directives, it was stated that an international standard required approval by at least 75 per cent of the member bodies casting a vote, and that the Secretary-General of ISO should make a special inquiry into cases where more than two negative votes had been cast, and consult, when appropriate, the interested parties. In the new edition of the directives this last condition is absent.

68. The result of the voting was unprecedentedly controversial. Indeed, of 26 ISO member bodies participating in the vote, 6 cast negative votes in respect of the introduction of a 9'06" height becoming a standard. Two other member bodies abstained and so, in accordance with the ISO directives, their

votes were not counted. Neither were two other votes which arrived after the deadline (19 September 1992). Among the P-members which did not approve the standard figured: Australia, Belgium, Cuba, Czech Republic, India, United Kingdom - all countries with non-negligible shares in container trades.

69. Formally and, in accordance with the above-mentioned conditions of the ISO directives, the draft standard was approved because among 21 P-members of the Technical Committee TC 104, 15 votes were in favour (71 per cent) and among 24 ISO member bodies votes cast, only 6 were negative (thus reaching the required 25 per cent). Consequently, ISO published Amendments to standards ISO 668, ISO 1496-1, ISO 1496-5 and ISO 3874 introducing containers 1AAA and 1BBB with a height of 9'6".

B. ISO Council resolution 22/1978

70. A change of the ISO directive is not the only evidence of a departure from the procedures favourable to developing countries; in this regard some general remarks come to mind.

71. In response to the question of stability of container standards - a need strongly advocated by all parties to the Ad Hoc Intergovernmental Group on Container Standards for International Multimodal Transport, TC 104 adopted resolution 71 drawing attention to the fact that the work on standardization of containers had reached a stage where a high degree of stability could be maintained. This idea was further elaborated in resolution 22/1978 on the same subject adopted by the ISO Council. This resolution, referring to a possible economic impact of substantial changes in the basic ISO container standards, requested that proposals for revision of these standards be widely circulated so as to permit the widest possible consultation. Moreover, a comprehensive report and an evaluation showing that these changes were in the common interest should be submitted supporting such proposals.

72. A remarkable shift in respect of this resolution took place at the seventeenth session of TC 104. 16/ Under the pretext of accelerating ISO procedures and eliminating "the discrimination" of TC 104 in comparison with other ISO technical committees, the presidency of the Committee (TC 104) proposed, and the developed countries supported, the proposal to withdraw ISO Council resolution 22/1978.

73. The presidency of TC 104 considered this resolution unjust and stated that the track record of the Committee "in no way demonstrates a blindness to the interests of developing countries".

74. Despite this statement, it should be underlined that this resolution, adopted under the influence of the deliberations on the subject of container standards within UNCTAD, is still quite pertinent. There has been continuous controversy within TC 104 between the interests of developing countries, which have very limited representation in the Committee, and the push towards bigger and heavier containers from the side of some Western countries. Numerous resolutions of the UNCTAD Committee on Shipping in this respect are evidence of the problems of such a situation. Resolution 22/1978 served on several

occasions as a constraining factor preventing premature adoption of some new standards on containers which did not satisfy the interests of all parties concerned, and developing countries in particular.

75. For this reason, delegations of developing countries (for example China and India) opposed the withdrawal of resolution 22/1978. Nevertheless, the Committee adopted by a majority a resolution inviting the ISO Secretary-General to review resolution 22/1978 "as to its current relevancy".

76. The abolition of resolution 22/1978 may be considered as evidence of a shift in the TC 104 procedures which may lead to its conversion into a club of vested interests dictating their will to the rest of the industry. Such a shift may undermine the value of this standardization body itself as being the recognized international authority whose role in the field of container standardization has been highly appreciated around the world. The UNCTAD secretariat has consequently expressed concern to the ISO central secretariat, insisting on the necessity to persuade the ISO Council to safeguard resolution 22/1978.

77. In this context, it is worth remembering a warning voiced by the UNCTAD Group of Experts on Container Standards for International Multimodal Transport which, when assessing the institutional framework within which ISO standards are developed, considered the composition of the experts who prepare draft proposals to be extremely important. Experts to a certain degree exert an influence on the development of a draft standard. Since developing a standard is a matter of compromise among different interests, it is important that all interests be duly represented. The Group of Experts noticed the lack of adequate representation of developing countries but in this respect it should be recognized that the situation has changed very little since that time. 17/

C. International agreement on container standards

78. The desire to ensure stability and confidence in the standards was the main reason for the adoption, at the end of 1972, of resolution No. 4 on Container Standards for International Multimodal Transport by the United Nations/IMCO Conference on International Container Traffic. That resolution called on the Economic and Social Council to consider the practicability of eventually drawing up an international agreement on container standards. In the opinion of a group of countries, such an agreement would ensure a reasonable stability of container standards elaborated by ISO, particularly concerning external dimensions and ratings of containers - the most important parameters with respect to modularity and exchangeability between different modes of transport. However, extensive discussions on this matter within the Ad Hoc Intergovernmental Group on Container Standards for International Multimodal Transport had revealed a profound difference among the approaches of groups of countries. Hence it had not been possible to reach an agreement at that time.

79. However, experience concerning developments in the field of container standards during the period which has elapsed since then has shown that an international agreement in this field would have represented a remedy addressing many problems. It would have permitted a representative and

professional discussion of the issues. The need for a reasonably flexible yet binding international mechanism in this field has been clear from the recent attempts to develop and introduce an international standard for a new generation of containers, the need for which is perceived, it should be recognized, for certain trades, at least at present. It may be expected that the pattern of the future development of trade will force the industry to return to the question of the introduction of a new generation of containers.

80. At the second ECE seminar (see para. 54) voices were raised appealing for measures which would prevent future uncertainties concerning international container standards as regards a proposed new generation of containers. One of the reports presented stated that "the resulting implications of a possible system of coordinating the dimensions of transport equipment for the future at world level are so great that an international convention should be concluded which would incorporate the provisions of the above-mentioned system and a timetable for its introduction in every region of the world". 18/

81. It is also remarkable that at the last meeting of ISO's TC 104, in June 1993, both developing and developed countries raised the issue of the pertinence of the conclusion of an international agreement safeguarding the necessary stability of the future container dimensions standards, in case new ones were adopted, and the scheduling of their worldwide introduction. A representative of a developing country stated in this respect that UNCTAD would be the most appropriate forum for forging such an agreement.

82. The confidence of all users and operators in getting stable international container standards would be assured by the elaboration and adoption of an international agreement on standards for containers designed for international transport. Such an agreement would provide the stability desired and establish an equitable regime for the application of internationally agreed container standards and thus contribute to the future orderly development of international container transport.

Chapter VI

CONTAINERS AND SUSTAINABLE DEVELOPMENT

83. The transport industry is directly concerned with the aims set out at the Earth Summit - the United Nations Conference on Environment and Development (June 1992). 19/ Agenda 21 is relevant to the UNCTAD focus as it attempts to instil the virtues of "sustainable development". Sustainability involves ensuring that current development processes give overriding priority to the needs of the world's poor while not compromising future economic and social development potentials. Such an aim requires adopting policies and technologies which do not endanger the natural ecosystems that support life on this planet.

84. The impact of the transport sector, from the ecological point of view, is significant. Any new development should take into account environmental aspects. The question of container dimensions is no exception in this respect.

85. For example, Association Française des Societés d'Autoroutes (ASFA) has declared that containers with a width of 2.6m present problems from the point of view of their transport on motorways in France. According to the present standards, the width of the lane is 3.5m, a width considered as insufficient for trucks and lorries from the point of view of road safety even with the present admissible width of 2.5m.

86. Reconsideration of the present motorway construction standards with a view to increasing the lane width will imply a requirement for more land and more pavement and will lead to a further degradation of the environment. In this respect, the introduction of containers wider and longer than the present ISO standard may be considered as environmentally harmful.

87. However, there is another aspect to be considered. Larger dimensions of containers mean that, for the same quantity of cargo, fewer containers are required. This could lead to savings in energy consumption and the consequent air pollution with an expected consequent reduction in the number of movements of containers and in road congestion. Nevertheless, the COST 315 study (cf. para. 41) reached the conclusion that, as regards road transport, the introduction of larger containers would have only limited or perhaps even negligible effect on the number of trips made, the reason being the limited market share of voluminous goods and, as a consequence, the limited number of large-load units. At the same time, with larger dimensions of vehicles, road safety could be compromised.

88. In the production of containers new materials and processes are used with the aim of decreasing the ecological impact of their manufacture. For example, new water-based paints rather than spirit-based ones are used so that fewer solvents are released into the atmosphere during their manufacture and the painting process.

89. The container industry is one of the principal consumers of tropical timber used in floor construction. The scarcity of resources and environmental considerations has led the industry to adjust and search

urgently for replacement materials. There are alternatives to the use of tropical hardwood timber, such as plywood treated with certain chemicals to enhance its durability not to mention the use of softwood timber species. However, despite current efforts, the development of satisfactory substitutes to hardwoods still appears to be in its beginning phases. Bearing in mind environmental considerations a preference in container production should be accorded to the use of recyclable materials.

90. International action to prevent damage to the ozone layer has led to a treaty which requires that new insulated and reefer containers be manufactured without the use of any chlorofluorocarbon (CFC) refrigerant agent and include insulation using non-CFC gas as a blowing medium. However, old refrigerants will still be used in a large proportion of all the reefer containers fleet for some years to come, as there is no ban on their use, but only their production. In this respect, an exchange of experience among different owners with regard to reclaiming and recycling of this refrigerant would be productive.

Notes

1/ Report of the Standing Committee on Developing Services Sectors: Fostering Competitive Services Sectors in Developing Countries - Shipping (TD/B/39(2)/5 - TD/B/CN.4/13, Annex I).

2/ The practicability and desirability of an international agreement on container standards (TD/B/AC.20/8, Annex 5).

3/ ISO Series 2 - Freight Containers, ISO/TC 104 N 715, 1991-09-03.

4/ Technical concepts available or proposed for larger containers, transmitted by the International Organization for Standardization (ISO) (TRANS/SEM.10/R.2).

5/ Survey on the Penetration of Non-ISO Standard Containers, compiled and printed in Tokyo, Japan, August 1992.

6/ Cargoware International, Special report: World Container Census, 1992.

7/ Supplementary report on the developments of the dimensions of loading units, European Conference of Ministers of Transport (CEMT/CS(92)7).

8/ Consequences for the organization of transport chain due to the introduction of larger containers. Transmitted by the secretariat of the European cooperation in the field of scientific and technical research COST 315 (TRANS/SEM.10/R.1).

9/ Impact of larger containers for port and inland container handling, Transmitted by the European Conference of Ministers of Transport (ECMT), (TRANS/SEM.10/R.12), p.17.

10/ Review of developments in standardization of containers and related activities, report by the UNCTAD secretariat (TD/B/C.4/329).

11/ Report of the Seminar on the impact of increasing dimensions of loading units on combined transport (1-4 September 1992) (TRANS/SEM.10/3).

12/ Idem., Annex, p. 17.

13/ Idem., Annex, p. 19.3.

14/ Reports of the Ad Hoc Intergovernmental Group on Container Standards for International Multimodal Transport, on its first and second sessions (TD/B/C4/20/6 and TD/B/AC.20/10).

15/ ISO-IEC Directives, Part 1, Procedures for the Technical Work, second edition 1992.

16/ Acceleration ISO/IEC procedures, Rescinding ISO Council resolution 22/1978 (ISO/TC 104 N 740).

17/ Report of the Group of Experts on Container Standards for International Multimodal Transport, 5-15 April 1976 (TD/B/AC.20/1, paras. 85-86).

18/ Consequences for the organization of the transport chain due to the introduction of larger containers. Report transmitted by the European Conference of Ministers of Transport (ECMT) (TRANS/SEM.10/R.11, para. 8 (v)).

19/ Cf. Policies and mechanisms for achieving sustainable development, report by the UNCTAD secretariat (TD/B/1304).